A Survey on Face Recognition by Memetic Approach

N.Kavitha, R.Jayaraj

***Abstract*— Face detection and Face Recognition has been regarded as a challenging Problem in the field of computer vision. It has become a new research in the identity authentication. In this paper, we propose two steps (i.e) First Face detection and then Face Recognition. Here Adaptive skin colour modelling is used for face detection and memetic approach for face recognition. Memetic algorithm are also known as hybrid EAs.A combination of global and local search makes MAs a powerful algorithmic technique for evolutionary computing.Facial Features were extracted with Zernike transform, trained and finally selection process is carried out. In this approach, we find results comparatively compared with the existing genetic algorithm.**

***Index Terms*—crossover probability(CP), evolutionary algorithm(EA), genetic algorithm(GA),local search probability(LSP),mutation probability(MP),neural networks (NN), parameters-population size(PS)**.

I. INTRODUCTION

Face detection and Face recognition has provided great concern on security and privacy[1][2].In the beginning for recognizing a face, face has to be detected.This Face detection process involves extraction and training of features.Face detec-tion is a general pre-processing step for analyzing images or videos of human beings.Skin dataset and Non Skin datasets are used and color histogram is calculated respectively.Both of the Datasets are trained using neural networks.

Later on face is detected using adaptive skin color modelling. In face recognition process,the features are first extracted from the data that represents it and then selection is carried out by optimization methods.Feature selection is an important consideration in several applications where one needs to choose a smaller subset of features from a complete set of raw measurements such that the improved subset generates as good or better classification performance compared to original data.Memetic algorithm is one of the approach which is used for feature selection.

II. RELATED WORKS

Face recognition is becoming a very interesting research area because of its potential applications.Face recognition process holds feature extraction and feature selection.Features are extracted for a set of images by Zernike transform.Later memetic approach is applied for further process. Face detection is a pre-processing step which is to be considered before face recognition[2].A set of 30 to 40 Datasets of individual's (i.e) males and females are taken.These datasets are trained separately and adapted with the testing image.A NN is trained to study the relation between the colors in the image and the expected illuminant[9][12].The advantage of using NNs is that there are no explicit assumptions regarding the image content. The input given to the NN are the combination of color space components of the skin pixels.The NN is trained on a set of images containing human faces and non faces under various illumination conditions.The results reported that NN adapts to illumination parameters.To recognize a face image, existing shift features were not accuracy based and the performance was also little poor.Previously the recognition rate were not satisfied for set of images.In this paper we propose Zernike moments which gives higher accuracy for feature extraction and applying in GA also provides good generation and recognition rate is much better compared with the existing. But when the generations become more it also takes more time

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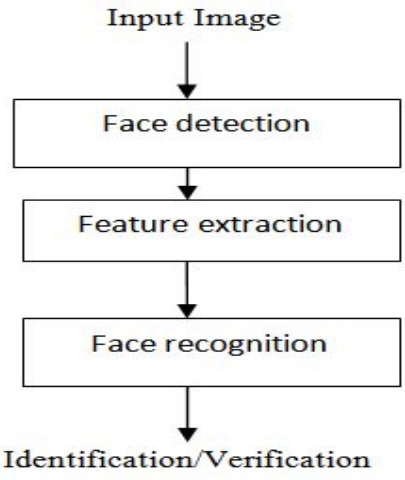
N.Kavitha, Student,Department of Information Technology, Satyabama University,Chennai,Tamilnadu,India

R.Jayaraj, Lecturer,Department of Information Science and Network Engineering, St.Joseph University in Tanzania, Dar-Es-Salaam,Tanzania

III. BASIC ARCHITECTURE

Process taking place from face detection to face recognition



IV. SYSTEM FRAMEWORK

A. Face Detection

Face detection is a common pre processing step for analyzing images or videos of human beings.In Face detection, we detect the face based on skin detection process.To overcome these drawbacks in skin detection we are going for three color space model (RGB, YCBCR, HSV).YCBCR remains to be the most successful one.

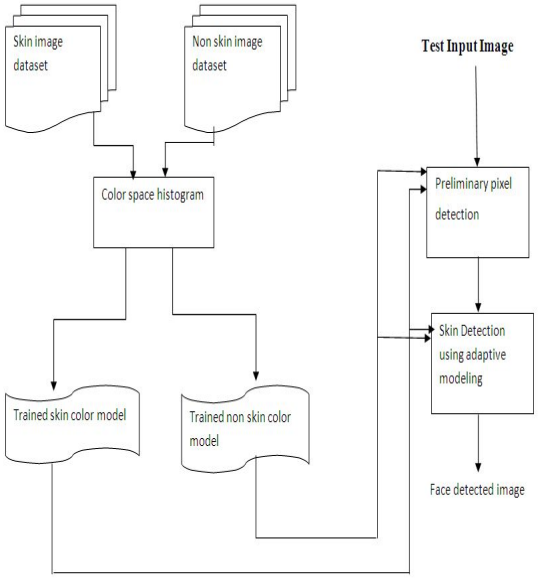


Figure: Architecture of Face detection process

B. Face Recognition

In face recognition process, the features are first extracted from the data that represents it and then selection process is carried out by optimization methods.Some of the various optimization methods for feature selection are ant colony optimization and joint boosting etc. Genetic algorithm is one of the approaches ,which are usually used for feature selection.But we have used Memetic algorithm for selection.

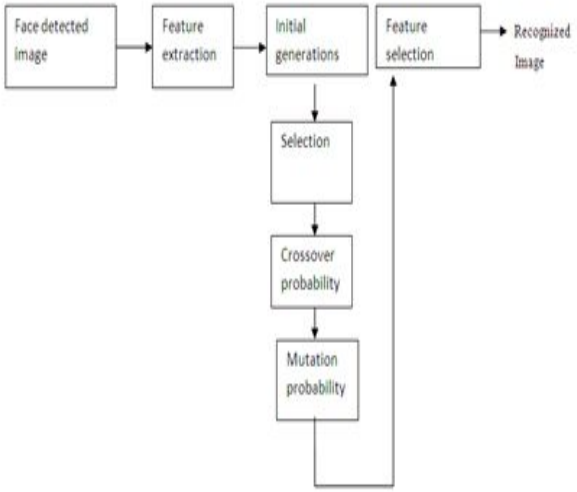


Figure: Architecture of Face recognition process

V. DIFFERENT STAGES

A. Training Stage

In this stage, Skin dataset and non skin dataset are taken and corresponding color histogram is obtained for both the datasets.Then skin and non skin color model are built form the trained images called trained color models[5][8].These trained color models are used to select the pixels most likely to be skin in an unknown image. Then, the selected skin pixels are used to build a new skin color model specific to this image and this new model is combined with the trained skin color model to detect all the skin pixels.The underlying idea behind the proposed approach is that the trained skin model is tuned by imposing a local skin model to make the resulting skin model adapt to the current testing image.

B. Testing Stage

Preliminary pixel detection: This step collects representative skin samples from the image to estimate the skin color distribution model specific to the image.Skin color model and non skin color model can be viewed as likelihood functions of skin class and non skin class[2].Pixels are likely to be skin based on the globally trained skin and non skin color models.

Adaptive skin color model: The trained skin model and test skin model are combined together to form adaptive model. Based on the adaptive skin color model, the adaptive skin likelihood of pixel can be obtained.Non-skin likelihood of pixel can be seen by looking into trained to show non-skin color model.

C.Feature Extraction

Based on the geometric flow of images and the second generation Zernike transform, a new feature extraction method was proposed and used to recognize human in images[1].Zerni-ke coefficients and their statistical values were extracted as the feature of human Images.

D. Feature Selection

Feature selection has become the focus of many research areas in recent years[1]. With the rapid advance of computer and database technologies, datasets with hundreds of variables or features are now ubiquitous in pattern recognition, data mining, and machine learning process. To process such huge datasets is a demanding task because traditional machine learning techniques usually work well only on small datasets.Most of the Feature selection notices this problem by removing the dissimilar, redundant, or noisy features. It improves the performance of the learning algorithms, reduces the cost, and provides us a better understandings of the datasets. We propose novel feature selection methods for gene selection using the concept of memetic algorithm (MA).

E. Memetic Algorithms

Memetic Algorithms (MAs) are evolutionary algorithms (EAs).Memetic Algorithms are also referred as population-based approach like genetic algorithms. Most of the problem domains show that they are orders of magnitude faster than traditional genetic Algorithms.In the memetic algorithm first the population is initialized at random or using a heuristic. Then each of the individual makes local search to improve its fitness.The genetic algorithm is not well suited for fine-tuning structures which are close to optimal solution[14].These are population based meta heuristic search methods inspired by Darwin's principles of natural evolution and rely on the concept of biological evolution and Darwin's concept of a meme defined as a unit of mimic cultural evolution that is capable of local refinements [12].In nature, all the genes are usually not modified throughout an individual's lifetime. The single aspect of MAs is that all chromosomes and off springs are mostly allowed to gain some experience during a local search before being involved in the

evolutionary process. MAs combines global and local search by using an EA to perform exploration,while the local search method performs exploitation.These are being used in wide variety of real world applications and in cryptography[14].To form a new population for the next generation,a higher quality individuals should be selected.

Once both the parents have been selected,they provide chromosomes in combined manner and the classical operator ofcrossover are applied to generate new individuals.Afterwards the later ones are enhanced using a local search technique.The task of local search in memetic algorithms is to locate the local optimum more efficiently then the genetic algorithm.

VI. PROPOSED FRAMEWORK

The combination of Evolutionary Algorithms with Local Search Operators that work within the EA loop has been termed Memetic Algorithms [1].Memetic algorithm is a extention of GA[13] which incorporates local search algorithm for each solution in between generations. local search is performed in between each generations, in addition to the techniques used by GA to explore the search space, namely recombination /cross over and mutation.The memetic algorithm is also known as Hybrid-Ga. Local search is performed to improve the fitness of the population so that the next generation has better genes form its parents, memetic algorithms incorporate the concept of memes b allowing the individuals to change before the next population is produced. Individuals may duplicate parts of genes from other individuals to improve their own fitness. Memes affect the behaviour of an individual and do not modify the genes themselves.

Begin;
Define strategy parameters for MA algorithm;
Iteration = 0;
Create initial population of chromosomes;
While iteration = Maximum iteration
- Constraint chromosomes if required;
- Get the features (eigenvectors) for each meme in the chromosome;
- Evaluate each set having predefined number of features and calculate recognition rate using Euclidean norm as the distance measure;
- Call MA procedure to get the new population;
- Iteration = iteration + 1;

End
End;

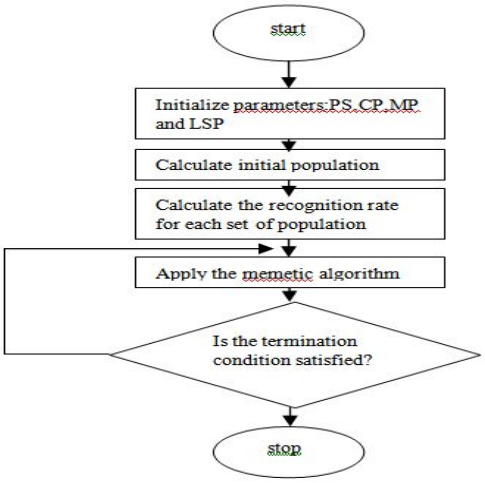


Figure: Flow chart for feature selection using memetic algorithm

VII. RESULTS AND DISCUSSION

The system developed is subjected to evaluation based on a known set of parameters. A set of 100 images were taken and test image was identified from those 100 images.For the performance evaluation we have calculated recognition rate.

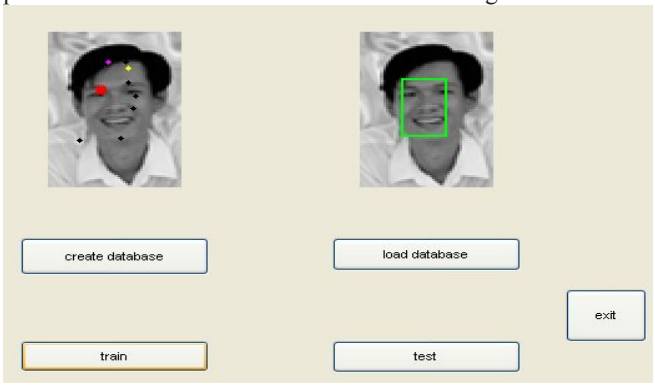


Figure: Face detected

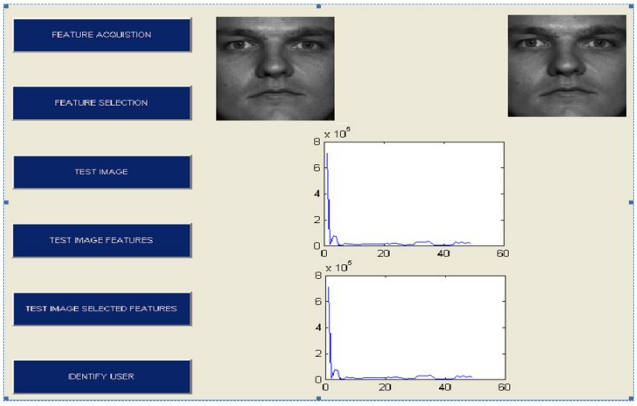
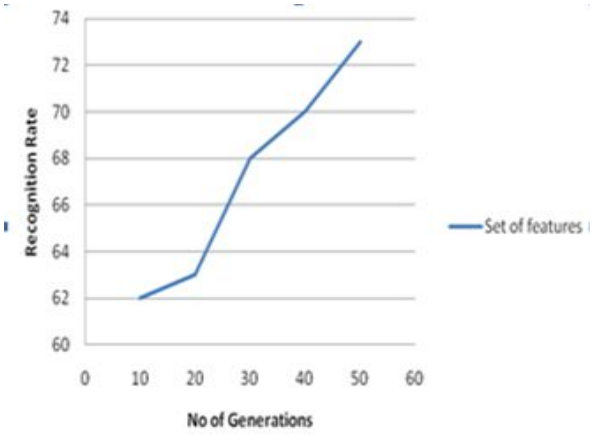


Figure: Face recognized

Recognition rate: For every number of generations we get different recognition rates .Number of generations is taken from 10-50.where 73 percentage recognition rate is feasible for generation **50.**



CONCLUSION

In this paper memetic approach is applied for feature selection in face recognition. The method uses Zernike features for feature extraction and memetic for selection. The experiments were carried to find the best response of the proposed method with the existing method.It was experimented that the recognition rate based on features selected by proposed method is much better than the existing. Future research work would include the comparison of the proposed method with the other optimization technique such as ant colony optimization.

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N.Kavitha received her B.Tech(IT) under Anna University and currently pursuing her M.Tech(IT) in Satyabama University,Tamilnadu,India.She has taken part in lot of sympsosiums.Her area of interest is image processing, networking,database and datamining.

R.Jayaraj received his B.E(CSE) and M.E(Multimedia Technology) under Anna University,Chennai.He is currently working in St.Joseph University in Tanzania as Lecturer under the Department of Information Science and Network Engineering.His area of interest is networking,multimedia,database and data mining.